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THE RELATIONSHIP BETWEEN THE FLUCTUATIONS OF BIRD EYE POPULATIONS AND

38

THE SALINITIES OF PONDS IN SOUTH SAN FRANCISCO BAY

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THE RELATIONSHIP BETWEEN THE FLUCTUATIONS OF BIRD POPULATIONS  
AND  
THE SALINITIES OF PONDS IN SOUTH SAN FRANCISCO BAY

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SENIOR PROJECT

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July 1980

Grade: \_\_\_\_\_

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#### ABSTRACT

A bi-monthly census of salinities and bird numbers was taken to determine if there was a correlation between the bird use and salinity of salt evaporation ponds near East Palo Alto. The study was conducted on four salt evaporation ponds in San Mateo County, from June 1978 through June 1979. Salinity readings were taken from each pond, and the total number of birds per pond was counted. The salinities ranged from a low of 50 ‰ (parts/1000) in Pond I to a high of 270 ‰ in Pond IV. Thirty-six species were identified and a total of 49,857 birds were counted. Shorebirds, waterfowl, and gulls were the most common species using the salt ponds.

The surface-feeding ducks and the phalaropes exhibited a preference for Pond I which had the lowest average salinity reading of the four ponds studies. The shorebirds, diving ducks, and gulls all showed a high degree of salinity tolerance and were found on all ponds. The shorebirds made the heaviest use of ponds which were sufficiently shallow for wading regardless of salinities, thus showing a possible food foraging preference.

#### INTRODUCTION

San Francisco Bay is unique because of its diversified habitat fulfilling the varying requirements for many species of birds. The Bay consists of deep open water with shallow sloughs and ponds all of which support a vast array of aquatic organisms upon which many of the bird species prey.

The objective of this study is to determine if a direct relationship exists between the number of birds using a pond and the salinity of that pond. In addition, the ponds were evaluated for their use as nesting, resting, and feeding habitat.

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#### LOCALE OF STUDY

Four salt evaporation ponds bordering both sides of Ravenswood Slough and San Francisco Bay, in San Mateo County, were selected for the study area (Figure 1). These ponds were chosen for their proximity to one another, their accessibility and the difference of salinity in each pond. The ponds are consecutively numbered one through four, and their surface areas were as follows: Pond I, 470.7 acres; Pond II, 138.7 acres; Pond III, 289.16 acres; Pond IV, 301.9 acres.

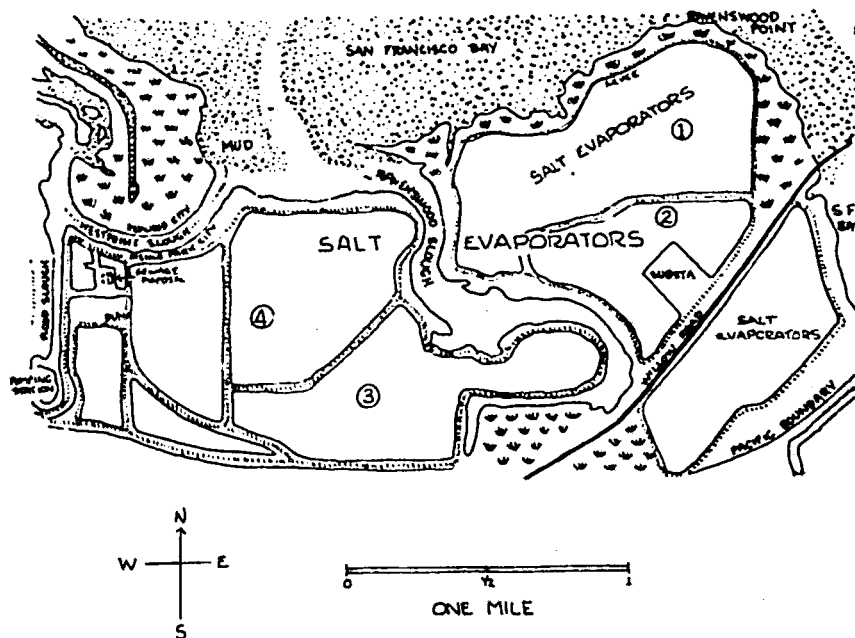


Figure 1

The evaporation ponds are used in the initial step for the production of salt. Salt water is pumped from the Bay into Pond I and sequentially through Ponds II, III, and IV. These ponds are concentration ponds where the water is evaporated to saturation with respect to sodium chloride (NaCl), and the less soluble salts are precipitated out. Since the salt water is allowed to sit in each pond until saturation, its salt concentration begins to increase. Therefore, Pond I has the lowest average salinity reading and Pond IV has the highest average salinity reading.

Unfortunately, access to Pond IV was impossible during the winter season due to excessive rain and wind, requiring its elimination from the study after four months of observation. This pond was also used by a duck club during the hunting season and resulted in very few birds observed using this pond.

#### METHODS AND MATERIALS

The number of birds by species occupying each pond was estimated twice monthly. This estimation was accomplished by observing the various groups of birds through a 20x spotting scope and 7 x 35mm binoculars. When bird numbers were low an individual count was obtained. However, when great rafts of birds appeared on the ponds only an estimation of the bird numbers could be made. To prevent duplications in the counting, the ponds were counted by sections from various observation points.

Salinity readings were recorded with each bird count. Since the salinities of the ponds were over 50 ‰ (parts/1000), a serial dilution was performed in order to obtain a reading from the salinometer. The serial dilution consisted of a 5 ml. sample of pond water to which 45 ml. of distilled water was added. Once the pond water was diluted a reading was taken with the salinometer. This reading was then multiplied by ten to obtain the true concentration.

## RESULTS

### Results of Salinity

Studies show an inverse relationship between salinity and the number of animal species. As the salt content increases, the number of animal species decreases through a natural selection for the types of animals that can withstand the high salinity of the water.

The data collected on salinity showed that Pond I had the lowest average salinity of 75  $^{50}/_{00}$  with a low of 50  $^{50}/_{00}$  and a high of 120  $^{50}/_{00}$ . Pond II had an average salinity of 96  $^{50}/_{00}$  with a low of 60  $^{50}/_{00}$  and a high of 150  $^{50}/_{00}$ . Pond III had the highest average salinity of 136  $^{50}/_{00}$  with a low of 100  $^{50}/_{00}$  and a high of 172  $^{50}/_{00}$  (Table I).

TABLE I

Salinity Results

Pond No.	Mean Annual Salinity $^{50}/_{00}$	Max. & Min. Salinity $^{50}/_{00}$	Annual Range of Salinity
1	75	50 - 120	70
2	96	60 - 150	90
3	136	100 - 172	72

### Results of Bird Counts

Thirty-six species including water oriented birds, raptors and a few terrestrial types were observed utilizing the ponds during the one year census period (Appendix I, Figures 2 - 4).

#### Surface Feeding Ducks

Surface feeding ducks and all unidentified ducks were classified in

one group since the majority of the population sampled were in this category. Five species were positively identified; Pintail, Greenwing Teal, Mallard, Gadwall and Northern Shoveler. The Northern Shoveler made up 42% of the surface-feeders followed by unidentified ducks 36%, Pintail 18% and Mallard at 3%. It was evident that surface-feeding ducks preferred low salinity conditions as 92% of the sightings were on Pond I which had the lowest average salinity (75 <sup>SO</sup>/00). These ducks were observed on the ponds from September through April with the greatest population counted in September.

#### Diving Ducks

Five species of diving ducks were recorded during the year. Eighty-seven percent were the Greater and Lesser scaup, followed by the Ruddy Duck 5%, Common Goldeneye 4%, Bufflehead 2% and Barrow's Goldeneye 2%. The diving ducks showed a higher degree of tolerance to salinity than the surface-feeding ducks, and 45% of the birds observed were on Pond II which had the second highest average salinity (96 <sup>SO</sup>/00). Pond I had 30% and Pond III 25% of the diving ducks sighted. This group of birds was observed using the ponds later in the year than the surface-feeding ducks and were present from December through April. The greatest population occurred in April when 1,442 birds were sighted.

#### Gulls

Gulls used the ponds year around, but were difficult to identify by species due to poor viewing conditions and the tendency of the birds to congregate in great masses. Most birds sighted were at such a distance positive identification was impossible. Three species of gulls were identified with the remainder listed as unidentified. Unidentified gulls made up 96% of all sightings followed by Bonaparte's Gull 3% and California Gull 1%; also one Herring Gull was sighted. It is evident that the majority of the gulls (76%) preferred Pond III with the highest average salinity (136 <sup>SO</sup>/00). The gulls appeared to have a greater tolerance to salinity; however, they may have preferred Pond III due to its proximity to a public dumping site since the pond was used strictly for resting.

### Terns

Terns made greatest use of the ponds from June through August and were first sighted in March. Due to the great distances from which observations were made, it was difficult to identify the birds by species. Three species of terns observed were Forster's Terns 36%, Common Terns 5%, and Caspian Terns 10%. Unidentified terns made up 49% of the total sightings.

In observing these birds it appeared they were nesting on an island in the west side of Pond I. Unfortunately, access to the island was not possible for positive identification of nests. This nesting activity was the most likely reason that 90% of terns were observed on Pond I and only 10% on Pond II. No conclusion can be made in the relationship of the tern sightings and the salinity of Pond I since no other ponds have adequate nesting sites. }

### Shorebirds

The nine species of shorebirds sighted tended to congregate on the ponds with the lowest water depth. Salinity seemed to be of little or no concern. Shorebirds could be found using the ponds year around.

Unidentified sandpipers made up 60% of all sightings followed by Dowitchers at 11%, Willet 9%, and Black-Necked Stilts at 8%. Other species sighted were American Avocets, Marbled Godwits, Long-Billed Curlews, Killdeer and unidentified plovers.

The smallest concentrations of shorebirds occurred during the month of June with the greatest concentration observed in the month of December. Pond III had the highest concentration with 61% followed by Pond I with 20% and Pond II with 19%. Pond III had the highest concentration of birds as this particular pond was shallow enough for wading most of the year while Ponds I and II had higher water levels. Pond III also has an uneven bottom and during low water levels many small islands can be seen.

### Phalaropes

The phalaropes consisted mainly of Northern Phalaropes and a few Wilson's Phalaropes. They are considered separately from the other shorebirds



since they are capable of swimming. Unidentified phalaropes made up the majority of birds with 80% followed by Northern Phalaropes with 20% of all sightings. Eighteen Wilson's Phalaropes were sighted during the one year census period. These birds were feeding primarily on brine shrimp (Artemia salina) and tended to concentrate on the ponds with heavy shrimp populations such as that found in Ponds I and II, thus correlating the greatest concentration of brine shrimp with the high density of phalaropes. The distribution of the sample observed was 68% of the sightings on Pond I, 23% on Pond II and 9% on Pond III. It is evident that the phalaropes preferred less saline conditions; however, this may also be due to the abundance of food in the ponds. }

Phalaropes were observed on the ponds from May through October and were most abundant during the month of August. They first appeared in May and none were sighted during the month of June.

#### Non-Water Oriented Birds

Swallows and raptors made sporadic appearances within the study area. The swallows, which were unidentified as to species, were observed flying swiftly along the banks of the salt ponds and did not use the ponds directly.

The raptors sighted consisted of one Red-Tailed Hawk and two Turkey Vultures. The Red-Tailed Hawk was observed flying low along the bank of Pond III in search of small rodents. The Turkey Vultures were sighted standing on a small island in Pond III when the pond was at a very shallow depth, and no feeding of carrion was observed.

#### Average Birds Per Acre

It was found that Pond III with its high salinity, low water level and uneven bottom had the greatest density of 88.2 birds/acre. Ponds I and II with their generally high water levels had 38.7 birds/acre and 51 birds/acre (Table II). It should be noted that this only shows which pond had the greatest density of birds and not the greatest diversity of birds.

TABLE II

## Average Birds Per Acre

Pond No.	Surface Area in Acres	No. of Birds	No. Birds/Acre
Pond I	470.7	18,210	38.7
Pond II	138.7	7,082	51.0
Pond III	289.6	25,557	88.2

## CONCLUSION

A direct correlation exists between bird numbers and salinity with the number of birds per acre increasing as the salinity of the ponds increased. This relationship reflects the high density of resting gulls in Pond III and not the largest number of bird species.

An inverse correlation exists between the number of bird species and salinity. Pond I has the greatest variety of birds and Pond III has the least number of different species using the pond.

The diving ducks and gulls which exhibited a marked preference for Ponds II and III use these ponds extensively for resting. The shorebirds made the heaviest use of Pond III which was sufficiently shallow for wading. The surface-feeding ducks used Pond I strictly for resting while the terns utilized the islands in the pond as a nesting habitat. During the summer months phalaropes fed on the large population of brine shrimp in Pond I.

The salt ponds serve as a valuable habitat for many species of migratory birds that frequent the San Francisco Bay area. These birds use the ponds extensively as a resting, nesting, and feeding habitat. As a result, the salt ponds along with the marshes and tidal flats are all important for the continued existence of wildlife in the San Francisco Bay.

## RECOMMENDATIONS

This study was to determine a correlation between the bird use of salt ponds and the salinity of the ponds. Only the bird counts and salinity readings were considered. It is apparent that other variables, such as pond depth, is associated with the selection of a particular pond by the birds. The observations made in the bird numbers/salinity study point out the need to broaden the scope for future studies of this kind.

The following recommendations are made:

1. Effort should be made to determine pond depth for each census day.
2. Effort should be made for quantifying and identifying the aquatic organisms of the ponds.
3. Specific stations should be located to provide consistency in sampling of salinity, food, water level and the counting of birds.
4. Easy access throughout the entire census period should be assured.
5. A control should be included for direct comparison such as a tidal marsh area.

## REFERENCES

- Anderson, William, A Preliminary Study of the Relationship of Saltponds and Wildlife - South San Francisco Bay. California Fish and Game, 1970. 56(4):240-252
- Carpelan, Lars H., Hydrobiology of the Alviso Salt Ponds. 1957. Ecology, 38(3):382-385
- Peterson, Roger Jory, A Field Guide to Western Birds. Houghton Mifflin Company, Boston, 1961. 309p.

#### ACKNOWLEDGMENTS

This project was made possible through the cooperation of the Leslie Salt Company and the U. S. Fish and Wildlife Service. A special note of gratitude must be made to Mr. James Walton who was most helpful in granting me special access privileges to the Leslie Salt property and to Mr. Robert Personius for allowing me to work within the confines of the San Francisco Bay National Wildlife Refuge. A final acknowledgement must be made to Dr. Russell Hirano for his encouragement and assistance throughout this project.

POND # I : BIRD COUNT AND SALINITY READING

FIGURE #2

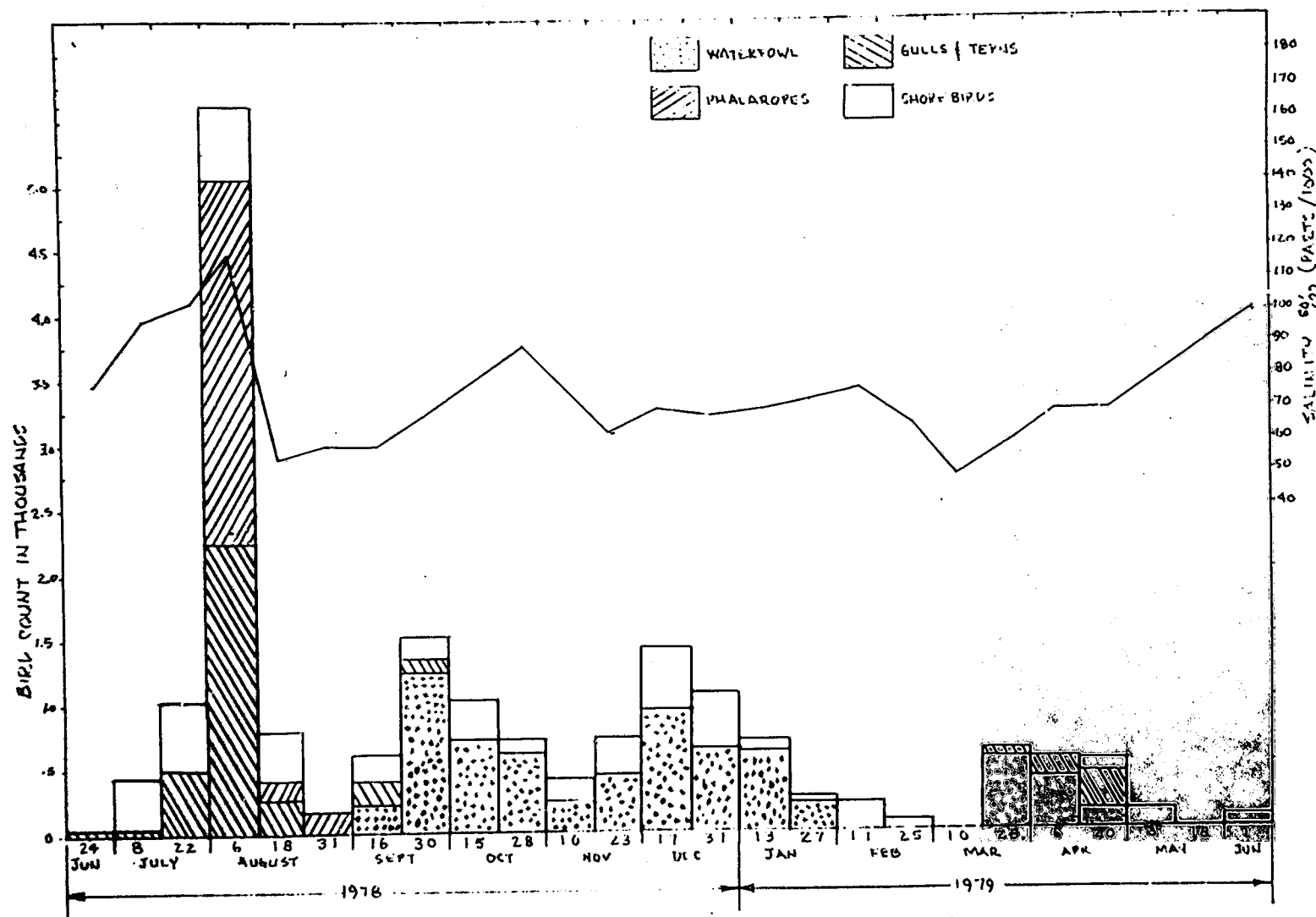
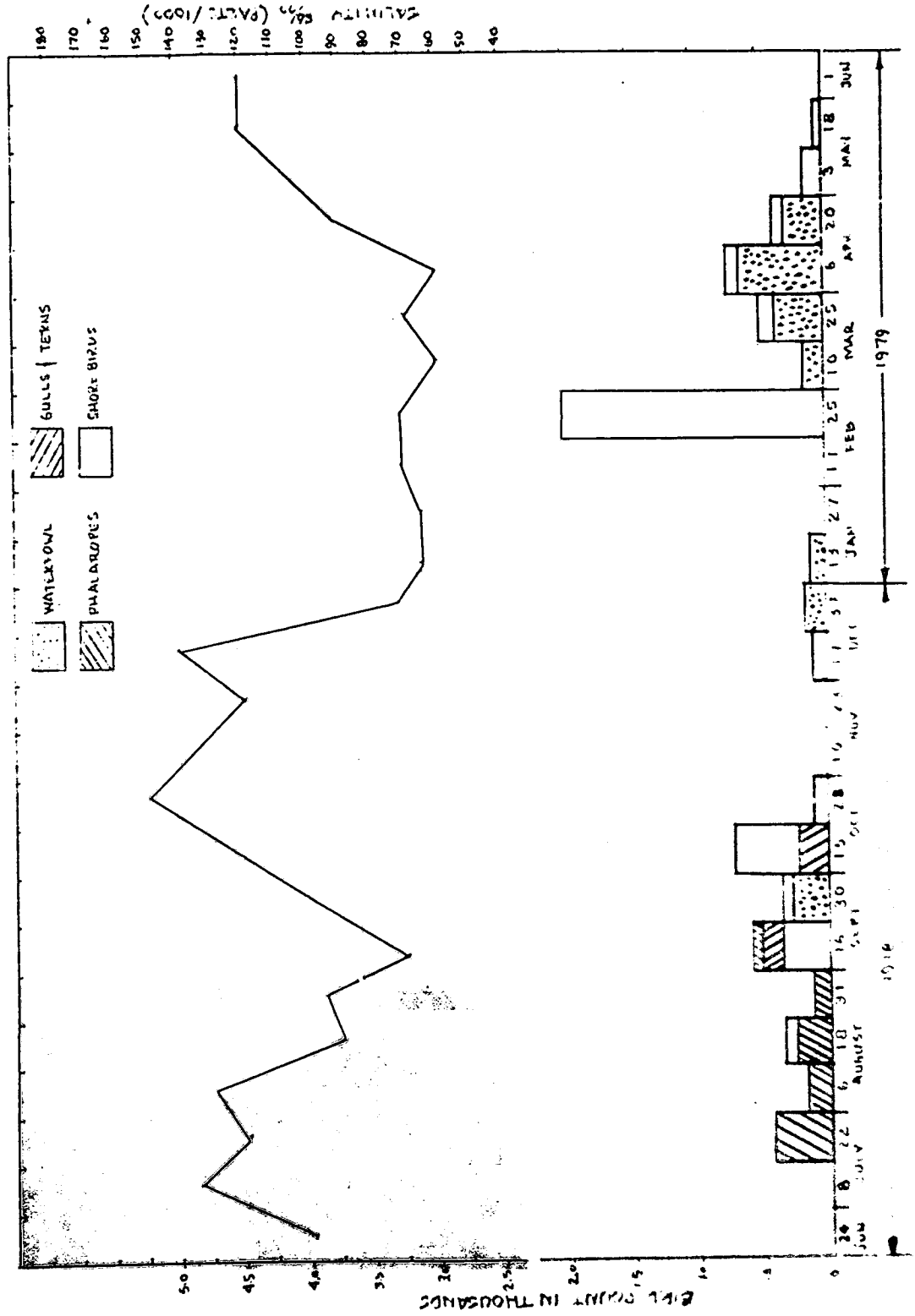
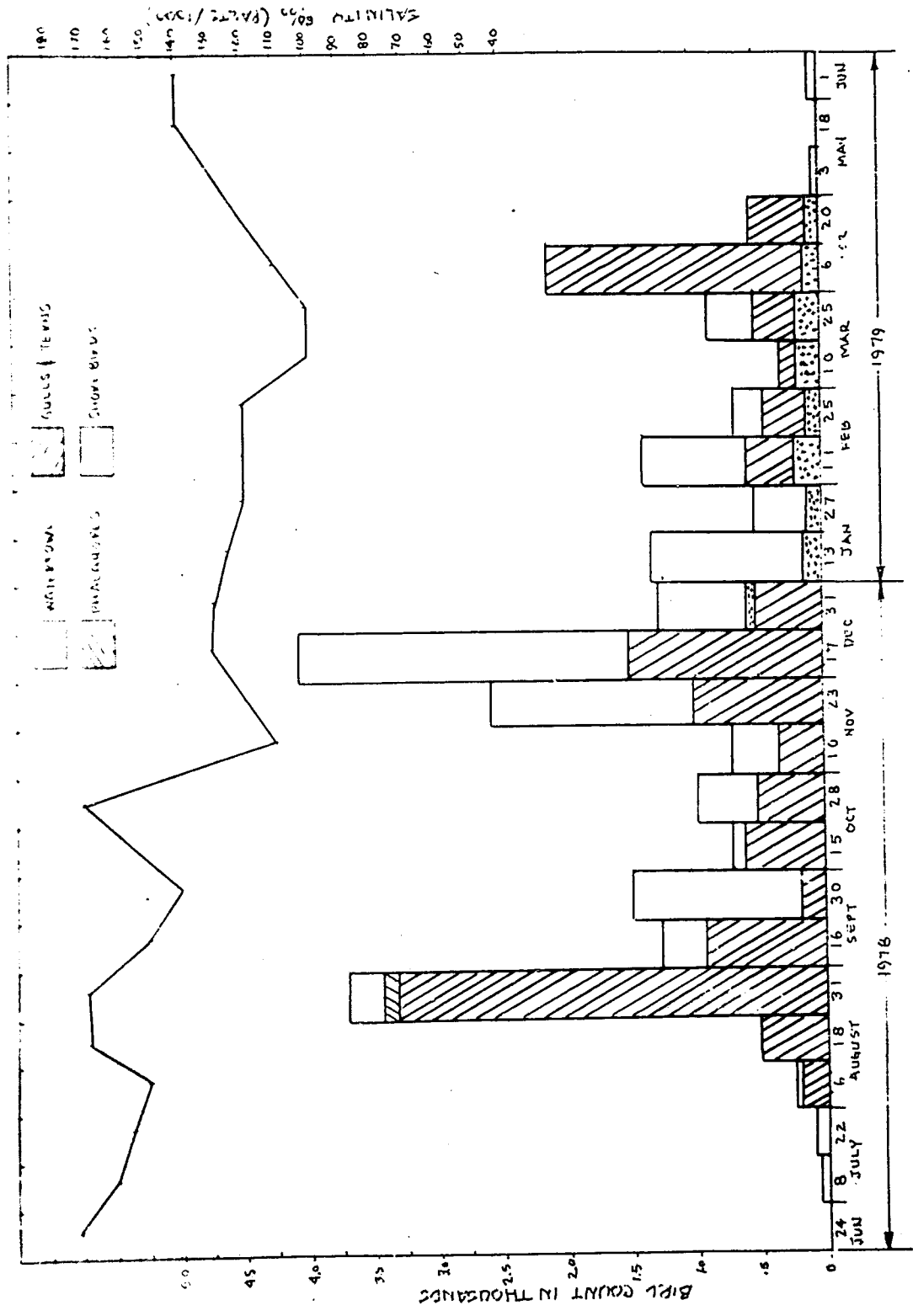


FIGURE #3

POND #II : BIRD COUNT AND SALINITY READING



POND # III BIRD COUNT AND SALINITY READING



## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 6-24-78 Time: 0800 Weather: clear, sunny, slightly windySalinity Readings by Pond: 1 82 S<sup>0</sup>/00 2 101 S<sup>0</sup>/00 3 169 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet			<u>2</u>	<u>2</u>
<u>Himantopus mexicanus</u>	black-necked stilt				
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus spp.</u>	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)				
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia spp.</u>	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern	<u>50</u>			<u>50</u>
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		<u>50</u>		<u>2</u>	<u>52</u>



APPENDIX - I

Total Number of Birds by Pond, South San Francisco Bay

Date: 7-8-1978 Time: 1030 Weather: clear, sunny

Salinity Readings by Pond: 1 101 S<sup>0</sup>/00 2 135 S<sup>0</sup>/00 3 159 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	18			18
<u>Himantopus mexicanus</u>	black-necked stilt	9	3	4	16
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher	5			5
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> r <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophox thula</u>	snowy egret				
Podicipedidae	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)	40			40
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
Phalaropodidae	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope	150			150
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia</u> spp.	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
Sterninae	tern (unidentified)	50			50
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	66		46	112
<u>Catoptrophorus semipalmatus</u>	willet	100			100
Hirundinidae	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals:		438	3	50	491

# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 7-22-1978 Time: 1030 Weather: sunny, no wind

Salinity Readings by Pond: 1 105 S<sup>0</sup>/00 2 122 S<sup>0</sup>/00 3 155 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	6			6
<u>Himantopus mexicanus</u>	black-necked stilt	21		7	28
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus spp.</u>	dowitcher	52		37	89
<u>Anatidae</u>	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)	430		1	431
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)	400	400		800
<u>Lobipes lobatus</u>	northern phalarope	200			200
<u>Steganopus tricolor</u>	Wilson's phalarope		2		2
<u>Erolia spp.</u>	sandpiper (unidentified)			30	30
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	33	27	30	90
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
<b>Totals</b>		<b>1142</b>	<b>429</b>	<b>105</b>	<b>1676</b>

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 8-6-1978 Time: 1015 Weather: clear, sunny, no windSalinity Readings by Pond: 1 120 S<sup>0</sup>/00 2 132 S<sup>0</sup>/00 3 151 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	<u>12</u>	<u>2</u>	<u>7</u>	<u>21</u>
<u>Himantopus mexicanus</u>	black-necked stilt				
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot	<u>593</u>	<u>6</u>	<u>16</u>	<u>615</u>
<u>Limnodromus spp.</u>	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)	<u>2100</u>		<u>259</u>	<u>2359</u>
<u>Larus argentatus</u>	herring gull			<u>44</u>	<u>44</u>
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer		<u>2</u>		<u>2</u>
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)	<u>3500</u>	<u>50</u>		<u>3550</u>
<u>Phalaropodidae</u>	phalarope (unidentified)		<u>164</u>		<u>164</u>
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia spp.</u>	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern	<u>2</u>			<u>2</u>
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	<u>3</u>			<u>3</u>
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		<u>6210</u>	<u>222</u>	<u>328</u>	<u>6760</u>

# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 8-18-1978 Time: 1400 Weather: sunny, slight wind

Salinity Readings by Pond: 1 55 S<sup>0</sup>/00 2 90 S<sup>0</sup>/00 3 169 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	<u>20</u>	<u>6</u>	<u>18</u>	<u>44</u>
<u>Himantopus mexicanus</u>	black-necked stilt				
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus spp.</u>	dowitcher				
<u>Anatidae</u>	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis or marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophox thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)	<u>158</u>		<u>515</u>	<u>673</u>
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull	<u>26</u>			<u>26</u>
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover		<u>1</u>		<u>1</u>
<u>Charadrius spp.</u>	plover (unidentified)	<u>98</u>	<u>300</u>		<u>398</u>
<u>Phalaropodidae</u>	phalarope (unidentified)	<u>55</u>	<u>1</u>		<u>56</u>
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope		<u>35</u>		<u>35</u>
<u>Erolia spp.</u>	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper	<u>16</u>			<u>16</u>
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern	<u>7</u>			<u>7</u>
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	<u>289</u>	<u>2</u>		<u>291</u>
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
<b>Totals</b>		<b><u>669</u></b>	<b><u>345</u></b>	<b><u>533</u></b>	<b><u>1,547</u></b>

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 8-31-1978 Time: 1225 Weather: clear, no windSalinity Readings by Pond: 1 62 S<sup>0</sup>/00 2 95 S<sup>0</sup>/00 3 172 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	<u>14</u>		<u>10</u>	<u>24</u>
<u>Himantopus mexicanus</u>	black-necked stilt				
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot			<u>150</u>	<u>150</u>
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
Podicipedidae	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)			<u>3,276</u>	<u>3,276</u>
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
Phalaropodidae	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope	<u>64</u>	<u>94</u>	<u>100</u>	<u>258</u>
<u>Steganopus tricolor</u>	Wilson's phalarope			<u>175</u>	<u>175</u>
<u>Erolia</u> spp.	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper	<u>5</u>			<u>5</u>
Sterninae	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	<u>13</u>	<u>3</u>		<u>16</u>
<u>Catoptrophorus semipalmatus</u>	willet				
Hirundinidae	Swallow (unidentified)		<u>2</u>		<u>2</u>
<u>Cathartes aura</u>	turkey vulture				
Totals		<u>96</u>	<u>94</u>	<u>3,716</u>	<u>3,906</u>

# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 9-16-1978 Time: 1300 Weather: clear, no wind

Salinity Readings by Pond: 1 60 S<sup>0</sup>/00 2 70 S<sup>0</sup>/00 3 150 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	<u>22</u>	<u>10</u>	<u>111</u>	<u>143</u>
<u>Himantopus mexicanus</u>	black-necked stilt				
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot	<u>30</u>	<u>256</u>	<u>107</u>	<u>393</u>
<u>Limnodromus spp.</u>	dowitcher				
<u>Anatidae</u>	ducks (unidentified)	<u>22</u>			<u>22</u>
<u>Anas acuta</u>	pintail	<u>59</u>			<u>59</u>
<u>A. carolinensis</u>	greenwing teal	<u>2</u>			<u>2</u>
<u>A. platyrhynchos</u>	mallard	<u>81</u>			<u>81</u>
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis or marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy	<u>1</u>			<u>1</u>
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)	<u>121</u>	<u>207</u>	<u>878</u>	<u>1,206</u>
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)			<u>100</u>	<u>100</u>
<u>Phalaropodidae</u>	phalarope (unidentified)	<u>43</u>	<u>46</u>	<u>20</u>	<u>109</u>
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope		<u>32</u>		<u>32</u>
<u>Erolia spp.</u>	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	<u>150</u>			<u>150</u>
<u>Cotoprophorus semipalmatus</u>	willet	<u>75</u>	<u>15</u>	<u>53</u>	<u>143</u>
<u>Hirundinidae</u>	swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
<b>Totals</b>		<b><u>606</u></b>	<b><u>566</u></b>	<b><u>1,269</u></b>	<b><u>2,441</u></b>

# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 9-30-1978 Time: 1000 Weather: clear, slight wind  
 Salinity Readings by Pond: 1 70 S<sup>0</sup>/00 2 100 S<sup>0</sup>/00 3 140 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	100			100
<u>Himantopus mexicanus</u>	black-necked stilt	54	2	19	75
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher	10		80	90
Anatidae	ducks (unidentified)	836			836
<u>Anas acuta</u>	pintail	232	254		486
<u>A. carolinensis</u>	greenwing teal	10			10
<u>A. platyrhynchos</u>	mallard	102			102
<u>A. strepera</u>	gadwall	10			10
<u>Spatula clypeata</u>	shoveler	10			10
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret	2			2
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)	56	21	206	283
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope	75	50		125
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia</u> spp.	sandpiper (unidentified)			1,050	1,050
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel			105	105
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Myrdinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		1,497	327	1,460	3,284

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 10-15-1978 Time: 1200 Weather: clear, slight windSalinity Readings by Pond: 1 no reading 2 no reading 3 no reading

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet			1	1
<u>Himantopus mexicanus</u>	black-necked stilt	60	24	6	90
<u>Ardea herodias</u>	blue heron	17			17
<u>Fulica americana</u>	coot			50	50
<u>Limnodromus spp.</u>	dowitcher				
Anatidae	ducks (unidentified)	500	2		502
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall	200			200
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)		2		2
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)	200	200	600	1,000
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk	4			4
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)		10		10
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope	5	500		505
<u>Erolia spp.</u>	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel			26	26
<u>Cotoprophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		986	738	683	2,407



# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

( Date: 10-28-1978 Time: 1215 Weather: clear, slight wind, duck hunting has started  
 Salinity Readings by Pond: 1 90 S<sup>0</sup>/00 2 150 S<sup>0</sup>/00 3 170 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	11			11
<u>Himantopus mexicanus</u>	black-necked stilt	2	3	16	21
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot	2			2
<u>Limnodromus spp.</u>	dowitcher	9		10	19
Anatidae	ducks (unidentified)	550			550
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler	92			92
<u>A. affinis or marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe		6		6
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)	9	20	521	550
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer	1			1
<u>Numenius americanus</u>	long-billed curlew			39	39
<u>Limosa fedoa</u>	marbled godwit			65	65
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia spp.</u>	sandpiper (unidentified)		51	25	76
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	2		283	285
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
<b>Totals</b>		<b>678</b>	<b>80</b>	<b>859</b>	<b>1,717</b>

## APPENDIX - I

Total Number of Birds by Pond, South San Francisco Bay

clear, windy,

Date: 11-10-1978

Time: 1000

Weather: dropped Pond 4 from study

Salinity Readings by Pond: 1 2 3

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet		5	93	98
<u>Himantopus mexicanus</u>	black-necked stilt				
<u>Ardea herodias</u>	blue heron			1	1
<u>Fulica americana</u>	coot				
<u>Limnodromus spp.</u>	dowitcher				
Anatidae	ducks (unidentified)	200			200
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall	5			5
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe		10		10
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)	1		327	328
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk		1	2	3
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope	125		300	425
<u>Erolia spp.</u>	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel			6	6
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		331	16	789	1,076

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

( Date: 11-23-1978 Time: 1200 Weather: cold and fair, rain past three days  
 Salinity Readings by Pond: 1 60 S<sup>0</sup>/00 2 120 S<sup>0</sup>/00 3 120 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet			160	160
<u>Himantopus mexicanus</u>	black-necked stilt	50	30	220	300
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot	4			4
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail	325			325
<u>A. carolinensis</u>	greenwing teal	25			25
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)			1,000	1,000
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer		2		2
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope	50		1,000	1,050
<u>Erolia</u> spp.	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel			150	150
<u>Cotoporphorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		494	32	2,530	3,056

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 12-17-1978 Time: 1200 Weather: cold, windy, rainySalinity Readings by Pond: 1 70 S<sup>0</sup>/00 2 140 S<sup>0</sup>/00 3 130 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	<u>1</u>	<u>37</u>		<u>38</u>
<u>Himantopus mexicanus</u>	black-necked stilt	<u>5</u>	<u>20</u>	<u>15</u>	<u>40</u>
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher	<u>500</u>			<u>500</u>
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler	<u>750</u>		<u>13</u>	<u>763</u>
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser			<u>1</u>	<u>1</u>
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophox thula</u>	snowy egret				
Podicipedidae	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)			<u>1,500</u>	<u>1,500</u>
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer			<u>50</u>	<u>50</u>
<u>Numenius americanus</u>	long-billed curlew			<u>400</u>	<u>400</u>
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
Phalaropodidae	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope			<u>2,000</u>	<u>2,000</u>
<u>Erolia</u> spp.	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
Sterninae	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	<u>100</u>	<u>2</u>	<u>75</u>	<u>177</u>
<u>Catoptrophorus semipalmatus</u>	willet				
Hirundinidae	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		<u>1,356</u>	<u>59</u>	<u>4,004</u>	<u>5,400</u>

# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 12-31-1978 Time: 1500 Weather: clear, cold  
 Salinity Readings by Pond: 1 68 S<sup>0</sup>/00 2 72 S<sup>0</sup>/00 3 130 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	<u>2</u>		<u>53</u>	<u>55</u>
<u>Himantopus mexicanus</u>	black-necked stilt	<u>17</u>	<u>14</u>	<u>71</u>	<u>102</u>
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)	<u>162</u>	<u>6</u>		<u>168</u>
<u>Anas acuta</u>	pintail	<u>1</u>			<u>1</u>
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler	<u>465</u>	<u>5</u>	<u>41</u>	<u>511</u>
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye		<u>5</u>	<u>8</u>	<u>13</u>
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy		<u>44</u>	<u>1</u>	<u>45</u>
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)		<u>4</u>	<u>8</u>	<u>12</u>
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)	<u>6</u>		<u>500</u>	<u>506</u>
<u>Larus argentatus</u>	herring gull	<u>1</u>			<u>1</u>
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew			<u>20</u>	<u>20</u>
<u>Limosa fedoa</u>	marbled godwit			<u>60</u>	<u>60</u>
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia</u> spp.	sandpiper (unidentified)	<u>306</u>		<u>450</u>	<u>706</u>
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Catoptrophorus semipalmatus</u>	willet	<u>14</u>		<u>17</u>	<u>31</u>
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		<u>974</u>	<u>78</u>	<u>1,229</u>	<u>2,281</u>

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 1-13-1979 Time: 1100 Weather: overcast, no windSalinity Readings by Pond: 1 70 S<sup>0</sup>/00 2 65 S<sup>0</sup>/00 3 125 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet				
<u>Himantopus mexicanus</u>	black-necked stilt			5	5
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler	590	1	62	653
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser			2	2
<u>Bucephala albeola</u>	bufflehead	1	18		19
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye		17		17
<u>Oxyura jamaicensis</u>	ruddy		3	30	33
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe		1	16	17
<u>Aechmophorus occidentalis</u>	western grebe	1			1
<u>Larus</u> spp.	gull (unidentified)				
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia</u> spp.	sandpiper (unidentified)	50		1,150	1,200
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Catoptrophorus semipalmatus</u>	willet			1	1
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		642	40	1,266	1,948

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 1-27-1979 Time: 1045 Weather: very windy and coldSalinity Readings by Pond: 1 72 S<sup>0</sup>/00 2 65 S<sup>0</sup>/00 3 120 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet			65	65
<u>Himantopus mexicanus</u>	black-necked stilt				
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot	20			20
<u>Limnodromus spp.</u>	dowitcher				
<u>Anatidae</u>	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler	110		25	135
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser	10		28	38
<u>Bucephala albeola</u>	bufflehead			16	16
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe	1		17	18
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)	7			7
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope			300	300
<u>Erolia spp.</u>	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	50		30	80
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		198		481	679

# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 2-11-1979 Time: 1040 Weather: slightly windy, clear

Salinity Readings by Pond: 1 75 S<sup>0</sup>/00 2 70 S<sup>0</sup>/00 3 120 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet			134	134
<u>Himantopus mexicanus</u>	black-necked stilt	3		284	286
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus spp.</u>	dowitcher				
Anatidae	ducks (unidentified)			13	13
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler	22		42	64
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser			44	44
<u>Bucephala albeola</u>	bufflehead			25	25
<u>B. clangula</u>	common goldeneye			50	50
<u>B. islandica</u>	Barrow's goldeneye		2		2
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophox thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe	3		13	16
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)		1	265	266
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer			3	3
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit	78			78
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia spp.</u>	sandpiper (unidentified)	30		500	530
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Catoptrophorus semipalmatus</u>	willet	6		81	87
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		142	3	1,454	1,599



# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 2-25-1979 Time: 1210 Weather: slight wind, cloudy

Salinity Readings by Pond: 1 65 S<sup>0</sup>/00 2 77 S<sup>0</sup>/00 3 120 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet			2	2
<u>Himantopus mexicanus</u>	black-necked stilt			9	9
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus spp.</u>	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler	2			2
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser			62	62
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye		3		3
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe	6	2		8
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)			350	350
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull			200	200
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia spp.</u>	sandpiper (unidentified)	10	2,000		2,010
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Catoptrophorus semipalmatus</u>	willet	32			32
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		50	2,006	623	2,678

# APPENDIX - I

## Total Number of Birds by Pond, South Sa Francisco Bay

Date: 3-10-1979 Time: 1030 Weather: overcast, windy

Salinity Readings by Pond: 1 50 S<sup>0</sup>/00 2 60 S<sup>0</sup>/00 3 100 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet			3	3
<u>Himantopus mexicanus</u>	black-necked stilt			19	19
<u>Ardea herodias</u>	blue heron			1	1
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser		37	105	142
<u>Bucephala albeola</u>	bufflehead		30	5	35
<u>B. clangula</u>	common goldeneye			52	52
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy		39		39
<u>Leucophoyx thula</u>	snowy egret			2	2
Podicipedidae	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe		13		13
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)			20	20
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull			41	41
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk			1	1
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
Phalaropodidae	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia</u> spp.	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
Sterninae	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	2		2	4
<u>Cotoporphorus semipalmatus</u>	willet				
Hirundinidae	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		2	119	251	372

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 3-25-1979 Time: 1045 Weather: cool, breezy

Salinity Readings by Pond: 1 60 S<sup>0</sup>/00 2 70 S<sup>0</sup>/00 3 100 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet	4		280	284
<u>Himantopus mexicanus</u>	black-necked stilt		7		7
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard	2			2
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser	500	338	150	988
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye		20		20
<u>B. islandica</u>	Barrow's goldeneye		20		20
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)	25		250	275
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull			100	100
<u>L. philadelphia</u>	Bonaparte's gull	50			50
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope		30		30
<u>Erolia</u> spp.	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper		10		10
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Coccyzophorus scapalmatus</u>	willet				
<u>Hirundinidae</u>	swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		581	425	780	1,786

# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 4-6-1979 Time: 0930 Weather: cool, slightly overcast

Salinity Readings by Pond: 1 70 S<sup>0</sup>/00 2 60 S<sup>0</sup>/00 3 110 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet				
<u>Himantopus mexicanus</u>	black-necked stilt	2	10		12
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus spp.</u>	dowitcher				
<u>Anatidae</u>	ducks (unidentified)				
<u>Anas acuta</u>	pintail	1			1
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard		1		1
<u>A. strepera</u>	gadwall				
<u>Scutula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser	332	550	110	992
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy		25		25
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus spp.</u>	gull (unidentified)			2,000	2,000
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull	159	5		164
<u>Totanus melanoleucus</u>	greater yellowlegs		1		1
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius spp.</u>	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia spp.</u>	sandpiper (unidentified)		63		63
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel	1		2	3
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
<b>Totals</b>		<b>495</b>	<b>655</b>	<b>2,112</b>	<b>3,262</b>

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 4-20-1979 Time: 1000 Weather: warm, sunny, slight windSalinity Readings by Pond: 1 70 S<sup>0</sup>/00 2 90 S<sup>0</sup>/00 3 120 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet		<u>2</u>		<u>2</u>
<u>Himantopus mexicanus</u>	black-necked stilt	<u>2</u>	<u>7</u>	<u>4</u>	<u>13</u>
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail	<u>1</u>			<u>1</u>
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser	<u>100</u>	<u>250</u>	<u>75</u>	<u>425</u>
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)		<u>1</u>		<u>1</u>
<u>Podiceps caspicus</u>	eared grebe		<u>32</u>		<u>32</u>
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)			<u>400</u>	<u>400</u>
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull	<u>150</u>			<u>150</u>
<u>Totanus melanoleucus</u>	greater yellowlegs		<u>1</u>		<u>1</u>
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia</u> spp.	sandpiper (unidentified)	<u>200</u>			<u>200</u>
<u>Erolia minutilla</u>	least sandpiper			<u>4</u>	<u>4</u>
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Hirundinidae</u>	swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		<u>458</u>	<u>282</u>	<u>404</u>	<u>1,144</u>

# APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 5-3-1979 Time: 1430 Weather: windy, cool

Salinity Readings by Pond: 1 no reading 2 no reading 3 no reading

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet				
<u>Himantopus mexicanus</u>	black-necked stilt			2	2
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)				
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer			3	3
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)		4		4
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia</u> spp.	sandpiper (unidentified)		120		120
<u>Erolia minutilla</u>	least sandpiper	100		3	103
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Catoptrophorus semipalmatus</u>	willet				
<u>Iridoprocne</u>	swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		100	124	3	227

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 5-18-1979 Time: 1110 Weather: sunny, warm, slight breezeSalinity Readings by Pond: 1 90 S<sup>0</sup>/00 2 120 S<sup>0</sup>/00 3 140 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet		1		1
<u>Himantopus mexicanus</u>	black-necked stilt	4	14	3	21
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophox thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)				
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk				
<u>Charadrius vociferus</u>	killdeer		5		5
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia</u> spp.	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Coccytophorus semipalmatus</u>	willet				
<u>Myristicidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		4	20	3	27

## APPENDIX - I

## Total Number of Birds by Pond, South San Francisco Bay

Date: 6-1-1979 Time: 1130 Weather: sunny, warm, no wind  
 Salinity Readings by Pond: 1 100 S<sup>0</sup>/00 2 120 S<sup>0</sup>/00 3 140 S<sup>0</sup>/00

Scientific names	Common names	Pond Number			Totals
		1	2	3	
<u>Recurvirostra americana</u>	American avocet			2	2
<u>Himantopus mexicanus</u>	black-necked stilt	5	8	14	27
<u>Ardea herodias</u>	blue heron				
<u>Fulica americana</u>	coot				
<u>Limnodromus</u> spp.	dowitcher				
Anatidae	ducks (unidentified)				
<u>Anas acuta</u>	pintail				
<u>A. carolinensis</u>	greenwing teal				
<u>A. platyrhynchos</u>	mallard				
<u>A. strepera</u>	gadwall				
<u>Spatula clypeata</u>	shoveler				
<u>A. affinis</u> or <u>marila</u>	scaup, greater and lesser				
<u>Bucephala albeola</u>	bufflehead				
<u>B. clangula</u>	common goldeneye				
<u>B. islandica</u>	Barrow's goldeneye				
<u>Oxyura jamaicensis</u>	ruddy				
<u>Leucophoyx thula</u>	snowy egret				
<u>Podicipedidae</u>	grebe (unidentified)				
<u>Podiceps caspicus</u>	eared grebe				
<u>Aechmophorus occidentalis</u>	western grebe				
<u>Larus</u> spp.	gull (unidentified)				
<u>Larus argentatus</u>	herring gull				
<u>L. californicus</u>	California gull				
<u>L. philadelphia</u>	Bonaparte's gull				
<u>Totanus melanoleucus</u>	greater yellowlegs				
<u>Buteo jamaicensis</u>	red-tailed hawk			3	3
<u>Charadrius vociferus</u>	killdeer				
<u>Numenius americanus</u>	long-billed curlew				
<u>Limosa fedoa</u>	marbled godwit				
<u>Charadrius alexandrinus</u>	snowy plover				
<u>Charadrius</u> spp.	plover (unidentified)				
<u>Phalaropodidae</u>	phalarope (unidentified)				
<u>Lobipes lobatus</u>	northern phalarope				
<u>Steganopus tricolor</u>	Wilson's phalarope				
<u>Erolia</u> spp.	sandpiper (unidentified)				
<u>Erolia minutilla</u>	least sandpiper				
<u>Sterninae</u>	tern (unidentified)				
<u>Sterna forsteri</u>	Forster's tern				
<u>S. hirundo</u>	common tern				
<u>Hydroprogne caspia</u>	Caspian tern				
<u>Numenius phaeopus</u>	whimbrel				
<u>Catoptrophorus semipalmatus</u>	willet	50			50
<u>Mirundinidae</u>	Swallow (unidentified)				
<u>Cathartes aura</u>	turkey vulture				
Totals		55	8	19	82